OPTO 22

SNAP ETHERNET I/O
D64 CAPTURE FIRMWARE

DATA SHEET

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Form 1320-040401

Part Number	Description
D64CAPTUREFIRMWARE	Digital data capture firmware for the SNAP-ENET-D64 brain

Description

Opto 22's high-speed D64 Capture Firmware gives an Opto 22 digital-only SNAP Ethernet I/O system or SNAP-IT unit the ability to capture on/off transitions, log transition data, and send the log to a PC or other host via standard 10/100 Mbps Ethernet.

Based on Opto 22's high-performance, flexible SNAP-ENET-D64 Ethernet brain, the firmware allows you to monitor up to 64 digital input points in one compact system. The system is available either as separately purchased components (brain, mounting rack, I/O modules, and power supply) or as a sturdy, pre-wired SNAP-IT panel-mount or rack-mount package.

A typical application is monitoring sequential shutdown of power generation equipment to determine the source of a problem. A tripped safety that causes several other safeties to trip can easily be pinpointed by operating personnel, saving time in analysis so equipment can be brought back up quickly.

The system with D64 Capture Firmware samples all inputs each millisecond and checks them for state changes from on to off or off to on. If a change is detected, it is logged in a 1000-sample buffer. The brain sends captured data via UDP to one or two designated hosts. This data can then be read and used by your application.

You can attach a system with D64 Capture Firmware to existing Ethernet networks, or you can use standard Ethernet hardware to build an independent network and connect a PC directly to the system.

Configuration

You can configure the D64 Capture Firmware using the SNAP-ENET-D64 memory map. Configuration data can be stored in nonvolatile flash memory. Configuration includes the following:

momoResetCounter (16 bytes, 2 bits per input point)—A must-on, must-off (MOMO) mask that indicates which input and which edge is used to reset the system's tick counter. Typically, turning on one input resets the counter.

The tick counter is a millisecond counter that synchronizes data from all input points. For applications requiring more than 64 input points, one input point on each system with D64 Capture Firmware can be hard-wired together to synchronize their counters. The tick counter is a 32-bit counter that counts milliseconds and rolls over after 49.71 days.

DontCareMask (8 bytes, one bit per input point)—A mask that indicates which input points are ignored when points are monitored. A 1 means ignore; a zero means monitor. The default is all zeros. To disable all logging, the mask can be set to 0xFFFFFFFF.

DestinationIPAddr1, DestinationIPAddr2, and **DestinationPort** (each 4 bytes)—Indicate the IP address and port for the PCs or other hosts that receive data via UDP from the system.

RetryIntervalmSec (4 bytes)—Indicates how long the system will allow for receipt of an acknowledgment (ACK) from the host before retransmitting. Packets are retransmitted to both destination addresses until an ACK is received from either host.

StatusIntervalmSec (4 bytes)—Indicates how often in milliseconds a packet will be sent if there are no changes on the monitored inputs.

This configuration data is available through the SNAP-ENET-D64 brain's memory map (location 0xF6000000).

Sample Buffer

The buffer stores data samples until they can be sent to the PC or other host via Ethernet. The buffer holds 1000 samples. If the buffer is overrun before the data is sent, the newest sample is discarded and an overrun counter is increased by one.

Input points are sampled each millisecond and samples logged to the buffer if changes are detected. A sample is also logged at the interval you set, whether inputs change or not. In addition, a sample with a tick count of zero is logged when the system is turned on. This sample indicates to the host that I/O units may need to be re-synchronized.

Each data sample in the buffer includes the following:

PacketType (4 bytes)—1 = standard sample, 2 = status heartbeat sent at the configured interval, 3 = buffer overflow

TickNow (4 bytes)—System tick count at the time of the current sample

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TickPrev (4 bytes)—System tick count at the time of the previous sample. This value should equal the TickNow value from the previous sample; if it doesn't, a packet was lost.

IoStatusNow (8 bytes, 1 bit per input point)—Mask showing the status of all inputs at the time of the sample (also contains the actual status of "don't-care" inputs)

IoStatusPrev (8 bytes, 1 bit per point)—Input status at the time of the previous sample. Use current and previous I/O status to determine which bit(s) have changed.

The system expects an ACK from the host that echoes the **PacketType** and **TickNow** items listed above. The system retransmits until an ACK is received or power is lost.

Buffer statistics, including the number of items added to the buffer, the number of items sent, and the number of overruns, are available through the SNAP-ENET-D64 brain's memory map (location 0xF6001000).

QtyCaptured (4 bytes)—Quantity of items captured in the buffers at the ISR level

QtySent (4 bytes)—Quantity of items removed from the buffers and sent at the task level

OverrunQty (4 bytes)—Quantity of items not captured in the buffers at the ISR level due to lack of space.

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Products

Opto 22 produces a broad array of reliable, flexible hardware and software products for industrial automation, remote monitoring, enterprise data acquisition, and machine-to-machine (M2M) applications.

SNAP Ethernet Systems

Based on the Internet Protocol (IP), SNAP Ethernet systems offer flexibility in their network connectivity and in the software applications they work with. The physical network may be a wired Ethernet network, a cellular wireless network, or a modem. A wide variety of software applications can exchange data with SNAP Ethernet systems, including:

- Opto 22's own ioProject™ suite of control and HMI software
- Manufacturing resource planning (MRP), enterprise management, and other enterprise systems
- Human-machine interfaces (HMIs)
- Databases
- Email systems
- OPC client software
- Custom applications
- Modbus/TCP software and hardware.

SNAP Ethernet system hardware consists of controllers and I/O units. Controllers provide central control and data distribution. I/O units provide local connection to sensors and equipment.

SNAP OEM Systems

Opto 22 SNAP OEM I/O systems are highly configurable, programmable processors intended for OEMs, IT professionals, and others who need to use custom software with Opto 22 SNAP I/O modules.

Linux® applications running on these systems can read and write to analog, simple digital, and serial I/O points on SNAP I/O modules using easily implemented file-based operations. Applications can be developed using several common development tools and environments, including C or C++, Java, and shell scripts.

M2M Systems

Machine-to-machine (M2M) systems connect your business computer systems to the machines, devices, and environments you want to monitor, control, or collect data from. M2M systems often use wireless cellular communications to link remote facilities to central systems over the Internet, or to provide monitoring and control capability via a cellular phone.

Opto 22's Nvio™ systems include everything you need for M2M—interface and communications hardware, data service plan, and Web portal—in one easy-to-use package. Visit nvio.opto22.com for more information.

Opto 22 Software

Opto 22's ioProject and FactoryFloor® software suites provide full-featured and cost-effective control, HMI, and OPC software to power your Opto 22 hardware. These software applications help you develop control automation solutions, build easy-to-use operator interfaces, and expand your manufacturing systems' connectivity.

Quality

In delivering hardware and software solutions for worldwide device management and control, Opto 22 retains the highest commitment to quality. We do no statistical testing; each product is made in the U.S.A. and is tested twice before leaving our 160,000 square-foot manufacturing facility in Temecula, California. That's why we can guarantee solid-state relays and optically-isolated I/O modules *for life*.

Product Support

Opto 22's Product Support Group offers comprehensive technical support for Opto 22 products. The staff of support engineers represents years of training and experience, and can assist with a variety of project implementation questions. Product support is available in English and Spanish from Monday through Friday, 7 a.m. to 5 p.m. PST.

Opto 22 Web Sites
- www.opto22.com
- nvio.opto22.com
- www.internetio.com (live Internet I/O demo)

Other Resources
- OptoInfo CDs
- Custom integration and development
- Hands-on customer training classes.

About Opto 22

Opto 22 manufactures and develops hardware and software products for industrial automation, remote monitoring, enterprise data acquisition, and machine-to-machine (M2M) applications. Using standard, commercially available Internet, networking, and computer technologies, Opto 22's input/output and control systems allow customers to monitor, control, and acquire data from all of the mechanical, electrical, and electronic assets that are key to their business operations. Opto 22's products and services support automation end users, OEMs, and information technology and operations personnel.

Founded in 1974 and with over 85 million Opto 22-connected devices deployed worldwide, the company has an established reputation for quality and reliability.

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